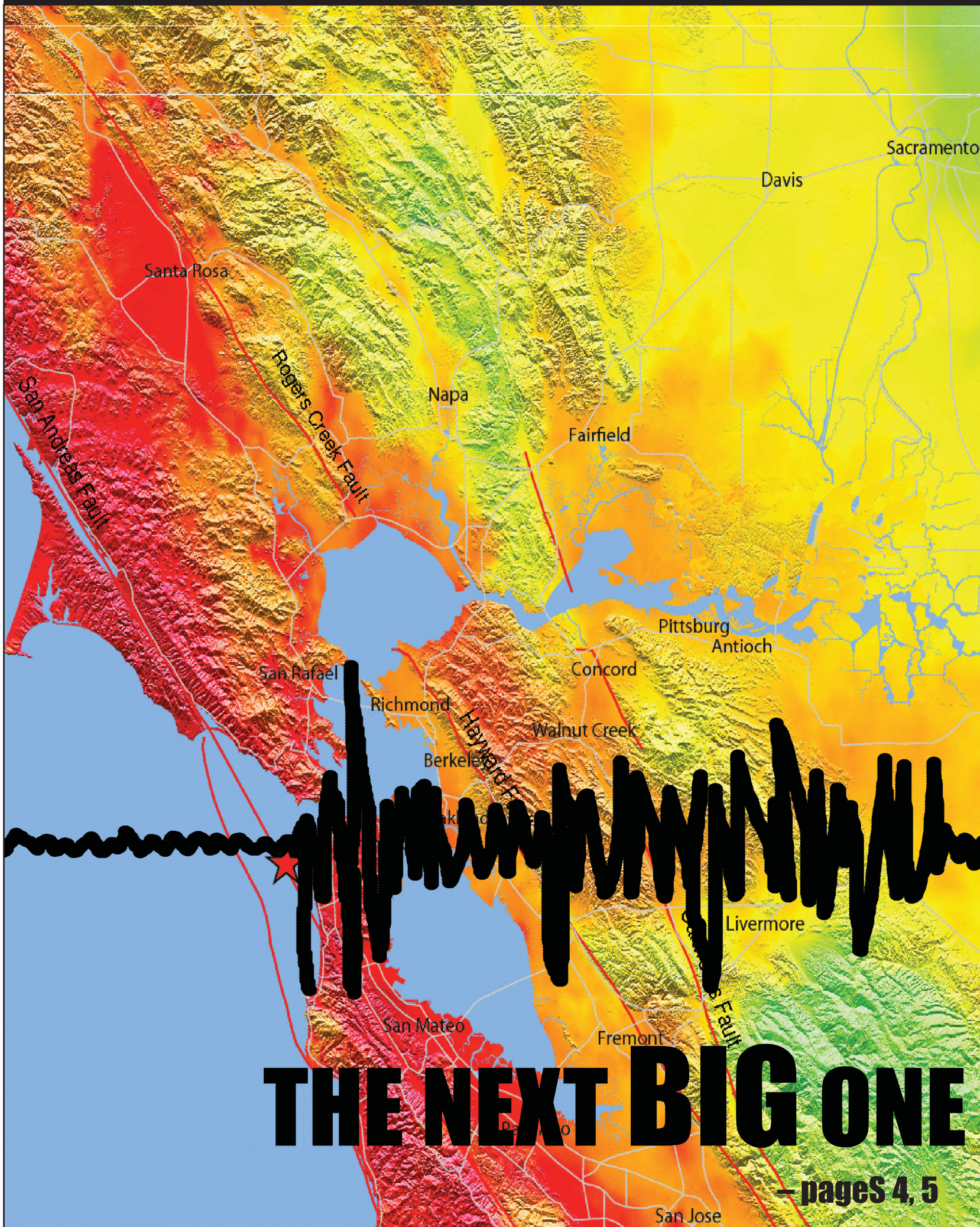


NEWSLINE

Published for the employees of Lawrence Livermore National Laboratory

April 14, 2006

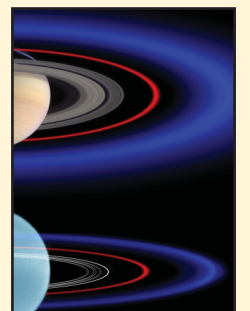
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LAB ANNOUNCEMENTS

Plan to consolidate weapons complex unveiled

Tom D’Agostino, National Nuclear Security Administration deputy administrator for Defense Programs, testified April 5, before the House Armed Services Committee on a plan to consolidate the DOE weapons complex.

This testimony unveiled NNSA’s response to the Secretary of Energy’s Advisory Board (SEAB) task force on the Nuclear Weapons Complex Infrastructure chaired by David Overskei. The plan includes moving plutonium from Livermore by 2014, and consolidating all U.S. work involving plutonium at a single facility by 2022.

The elements of a responsive infrastructure include the people, the science and technology base, the facilities and the equipment to support a right-sized nuclear weapons enterprise — as well as practical, streamlined business practices that enable rapid and flexible response to emerging needs.

The SEAB task force concluded: the status quo is neither technically credible nor financially sustainable;

the Cold War stockpile should be replaced with a sustainable stockpile; NNSA should complement past investment in the three design labs with investment in a modern 21st century production center; and consolidation of special nuclear material (SNM) is feasible, will save money, and will reduce Design Basis Threat risk.

These insights and recommendations guided NNSA’s thinking on transformation, and provided concrete, practical steps that were incorporated into the plan for 2030.

NNSA agrees with these Task Force’s recommendations:

- For the immediate design of a Reliable Replacement Warhead (RRW).
- To aggressively pursue dismantlement as part of deterrence.
- To create an Office of Transformation within Defense Programs both to drive change and lead nuclear weapons complex transformation, and
- To manage risk more effectively in research and development (R&D)

and production activities by employing cost-benefit analysis and risk-informed decisions.

The most sweeping recommendation was for DOE to establish a Consolidated Nuclear Production Center by 2015, as the single site for all R&D and production involving significant amounts of special nuclear material (SNM).

NNSA strongly agrees with the principle of SNM consolidation, but in its 2030 vision, plans to consolidate SNM to fewer sites, and fewer locations within sites-however, not to a single site. In principle there would be a plutonium site and a uranium site.

NNSA must preserve that intellectual competition required for truly independent peer review and assessment, and the essential capabilities for nuclear weapons science and technology. The future R&D complex would retain two independent centers of excellence for nuclear warhead design/development at Los Alamos National Laboratory and LLNL, each supported by Sandia for non-nuclear

component design.

Large-scale plutonium R&D currently done at Livermore and Los Alamos would relocate to a single consolidated plutonium center for plutonium R&D and production. The center’s location remains undetermined, but would be situated at an existing site.

The plan removes all Cat I/II SNM from Livermore by the end of 2014, but small-scale plutonium R&D would continue here. The operational consolidated plutonium center would host all plutonium R&D, surveillance, and manufacturing operations. To support plutonium operations at LANL, and to absorb plutonium R&D currently being carried out at Livermore’s Building 332, the Chemistry and Metallurgy Research-Replacement facility would operate as a Category I/II facility until 2022.

In the 2020’s, large-scale hydrodynamic test facilities would transition to NTS. Site 300 retains its national mission and should remain active until an equivalent facility can accommodate its national defense functions and volume.

Department of defense officials briefed on Lab nuclear programs

Associate Director Bruce Goodwin hosted three officials from the Department of Defense in late March. Steve Henry, deputy assistant to the secretary of defense for Nuclear Matters, was the principal dignitary. Accompanying him from Washington were his senior technical adviser Peter Terrill, and special assistant Devin Biniaz.

To help the DoD understand the reconfiguration issues that are currently being addressed throughout the National Nuclear Security Administration weapons complex, Henry and his staff have been visiting various sites around the country. Henry is the focal point in the Pentagon for issues related to the U.S. nuclear stockpile.

In addition to reconfiguration and enterprise transformation, he deals with all Stockpile Stewardship Program and nonproliferation matters brought up before the Nuclear Weapons Council, and is directly involved in the Reliable Replacement Warhead assessments. Henry has established a close working relationship between the DoD and the national labs.

On Friday, March 24, Henry made a Defense and Nuclear Technologies Distinguished Speaker Series presentation to employees in the Bldg. 132 auditorium entitled “Nuclear Enterprise Transformation.”



BRYAN QUINTARD/TID

Jacqueline Kenneally of the Lab’s Chemical Biology and Nuclear Sciences Division with Steve Henry and Devin Biniaz of DoD during a Bldg. 151 tour of radiochemical facilities that were part of a Defense and Nuclear Technologies-sponsored two-day visit in March by DoD dignitaries.

IN PROFILE

Edwards returns to Lab after Army ‘JAG’ experience

By Linda Lucchetti
Newsline staff writer

Lab attorney Matt Edwards is glad to be back at work, eating Italian food and driving on the freeway. He recently returned to the United States after living in the Caribbean for 14 months — but not on an extended vacation.

As a member of the California Army National Guard, Edwards served with the U.S. Army Judge Advocate General’s Corps, or JAG, in Guantanamo Bay, Cuba, providing legal services to members of the Army, Navy, Air Force, Coast Guard and Marine Corps. The Joint Task Force there has a population of approximately 3,000 military personnel whose average age is about 22.

Edwards provided legal assistance for troops on civil matters — “home front” issues such as divorce and child support. He also provided briefings to groups ranging from 10 to 100 on a wide range of topics like federal ethics and sexual harassment.

“I was constantly busy. I handled some 900 clients — that’s 45 per week,” Edwards added. “When I left the Lab last February, I didn’t anticipate how rewarding this would be for me — working with clients one-on-one. I want to thank Jan Tulk, my colleagues, and the Laboratory for their support.”

Edwards said that along with giving legal assistance, he often found himself taking on the role of marriage counselor and even getting emo-



PAO/JTF GUANTANAMO BAY

Major Matt Edwards (left) receives an Army “coin” from Lieutenant Colonel Jeremy Martin, the Joint Task Force (JTF) Guantanamo public affairs officer, for his numerous articles written for the JTF newspaper, “The Wire.” Coins are used in the Army to say “well done.”

tionally involved. “My best moment came after advising a 24-year old who I could tell really did not want to follow the advice I gave him. A few months later, he came to me and thanked me for helping to turn his life around.”

Edwards noted that the down-side of being gone so long is being away from family and friends. Although e-mail and phone calls are

good, they don’t provide the face-to face time together that we all need.

He was able to keep up with Lab news and events by accessing *Newsline* on the Internet. About the changes the Lab has experienced, Edwards said, “Lab employees may think that there have been many changes over the past year, but having been removed from the site, I don’t see it that way. Since returning, I see the Lab culture as still the same and I see progress toward our long-term goals, which I expected would happen.”

During his free time, Edwards exercised every day — usually running three or four miles in the early morning before the heat hit and also enjoying bowling and water skiing, activities that resulted in a loss of 20 pounds.

Ironically, on the last day of his tour, while debriefing back in the United States, at Fort Lewis in Washington state, he was exercising when he slipped, fell and broke his ankle. He will be walking with a foot brace and crutches for about six more weeks.

“I now have a new appreciation of the many challenges that disabled people face,” he said.

“I loved my time away. It was really an ‘out of body experience,’ being away from my daily routine for so long. I’ve gained compassion for people’s lives. And, I’ve made a resolution — I want to get out of my office more and talk to people on their own turf, where they are most comfortable. It will make me a more effective attorney and adviser to my clients here at the Laboratory.”

Quake anniversary inspires Lab tremblor exercise

The month of April marks the 100th anniversary of the great San Francisco Earthquake of 1906. On April 25, LLNL will conduct its annual integrated emergency preparedness and response exercise with this anniversary in mind.

This exercise is designed to demonstrate that the Laboratory is prepared to respond to an emergency. In addition, this year’s exercise will also be a test of the recently revised LLNL Self Help Plan to include site-wide facility evacuation, accounta-

bility and communication in response to a major earthquake in the Bay Area.

Drills and exercises are designed to ensure the safety of employees, test the emergency response capabilities at LLNL and comply with various regulatory requirements. All employees are encouraged to review the location of their assembly point and ask their supervisor if they are uncertain.

Employees in limited area facilities with alarmed doors that would be crashed out in an emergency situation must prepare Security

Certification forms to ensure monitoring and re-sealing of doors crashed during the exercise. The Protective Force Division (Mark Short, Emergency Management administrator) must receive Security Certification forms and door sealer requests no later than April 19.

Certification forms and updated information sheets are available by contacting the LLNL Security Department at 2-6998.

If during the exercise you see activity near your facility or come upon an event scene (fire and security vehicles, flashing

lights, barrier tape), respect the scene and choose an alternate route. This action is important for maintaining the integrity of the exercise, but more importantly, it is for your safety and the safety of the exercise participants. Signs will be posted at all Laboratory entrances as well as in specific exercise areas the day of the exercise. In addition, a site-wide announcement will be made following the start and conclusion of exercise activity.

Look in *NewsOnLine* for additional information as the exercise approaches.



SCIENCE NEWS

1906 earthquake provides lessons for managing future seismic risks

By Anne M. Stark
Newsline staff writer

Not if but when? When will the next “great” earthquake strike the Bay Area? While scientists can’t look into a crystal ball for the answer, they can study the past and present to get an idea of when and how the next 7.0 magnitude or larger earthquake will strike Northern California. Even if they could predict earthquakes, there is no way to stop the strong ground shaking that causes landslides, liquefaction and damage to structures.

With a series of faults running through the region like an earthworm slithering through soil, the U.S. Geological Survey predicts there is a 62 percent chance that a 6.7 or larger tembler will occur in the next 30 years on one of the eight major Bay Area faults.

On the centennial of the great 1906 San Francisco earthquake, LLNL researchers will converge in San Francisco for the 100th Anniversary Earthquake Conference: “Managing Risk in Earthquake Country,” to show off simulations of the 1906 earthquake. This year also marks the 100th anniversary of the Seismological Society of America, which was formed after the great San Francisco earthquake.

The simulations paint a historical picture of what happened 100 years ago on April 18.

“Through these simulations, we can understand what actually happened in 1906 and apply it to the current situation in Northern California,” said Shawn Larsen, an earthquake seismologist and computer scientist who has worked on the 1906 earthquake project for the last two years and a member of the Lab’s Hazards Mitigation Center.

Larsen’s simulations show the peak ground motion for the best simulation of the 1906 earthquake and for a 7.8 scenario earthquake along the San Andreas Fault that starts in the north and ruptures to the south.

Larsen points out some key differences between the two simulations. “Although the epicenter for the 1906 earthquake was just west of San Francisco, the ground shaking in San Francisco was relatively mild,” Larsen said. “However, if the earthquake had initiated up in the north near Cape Mendocino, the shaking would have been much more extreme in San Francisco. In this case, build-up of seismic energy would have slammed into the Bay Area. In some sense, this is counter intuitive. Strong ground motion can be higher when the epicenter is farther away.”

Seismic waves burst from the epicenter. P waves compress and stretch rock delivering the first jolt you feel. However, the S waves that follow are often more destructive, moving the ground from side to side. Both waves produce surface waves that can travel hundreds of miles from the epicenter, triggering destruction along their path.

These vicious seismic waves are what LLNL scientists are now looking at to determine how the next “great” quake will affect the Tri-Valley, Central Valley and Sacramento Delta region.

The Bay Area fault with the highest probability of slipping in the next 30 years is the Hayward-Rodgers Creek Fault with a 27 percent chance.

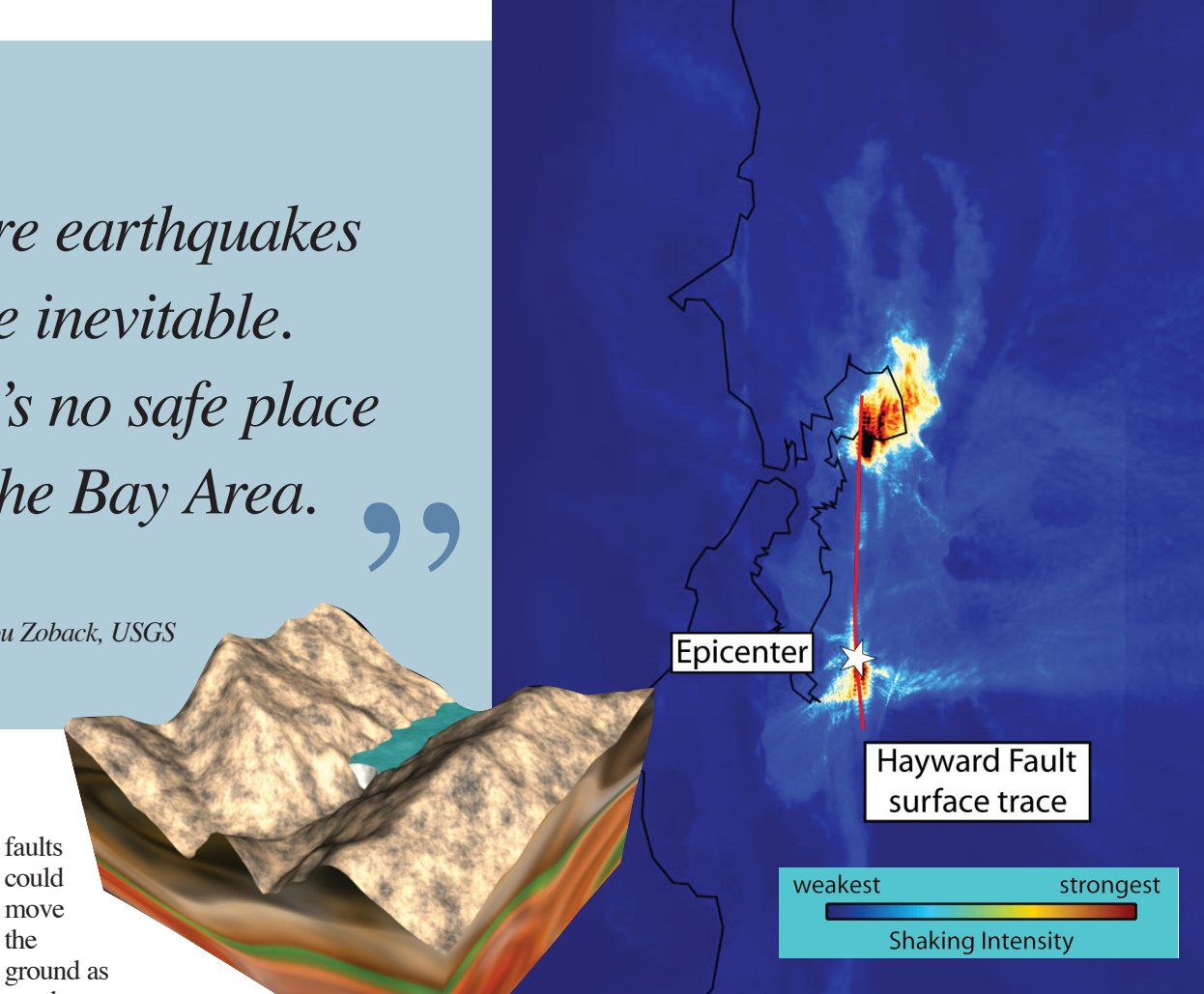
Mary Lou Zoback, coordinator of the U.S. Geological Survey’s earthquake hazards team, who recently spoke at the Laboratory as part of the Director’s Distinguished Lecturer Series, warned that the Hayward Fault is a high-risk area for future shaking.

“The Hayward Fault has had a 6.5 to 6.7 earthquake every 150 years and the last one was in 1868,” she said. “You can do the math and you can see why we’re really worried about this fault.”

Arthur Rodgers, Livermore’s seismology group leader, is proposing further studies to specifically compute earthquake ground motions for major Bay Area faults and their effect on critical infrastructure.

He said a major earthquake along the Hayward, Greenville or Calaveras

“Future earthquakes are inevitable. There’s no safe place in the Bay Area.”
— Mary Lou Zoback, USGS



Above: Ground shaking amplitude for a simulation of a possible 7.0 earthquake on the Hayward fault. Inset: 3-D model of a dam.

faults could move the ground as much as one meter per second.

With that much ground motion, it is critical to assess what would happen to buildings, transportation corridors, dams, bridges and levees.

“The Delta levees are prone to liquefaction which is a phenomenon that occurs when water-saturated material is subjected to shaking,” Rodgers said. “The levees were built on weak, water-saturated materials. Through modeling, we can look at the physics and engineering of how the levees will respond to an earthquake.”

Liquefaction occurs during an earthquake when soil is saturated. The ground that was once solid loses its strength, which can in turn cause buildings to sink and levees to fail.

Zoback said the 1906 quake had a huge effect on the Delta region that not many people realize. “It took 23 seconds to hit the Delta,” she said. “In 30 seconds, the entire region felt it.”

The Delta region was sparsely populated and mainly farmland at the time. Today there are hundreds of thousands of people who live, work and travel through the area.

Lab seismologists working with computer scientists and engineers use some of the Laboratory’s most powerful supercomputers to perform their simulations so they can not only assess the shaking but so they can determine the effects on critical infrastructure.

Chad Noble, a Lab civil engineer working with Rodgers, is specifically studying how future earthquakes would affect dams, tunnels and levees.

“We can model the ground motions at some depth near the structure,” he said. “We can then propagate the motion through the geology and engineered structure and see what the effects would be.”

He said the new project is leveraging some of the earlier work he’s done in national security. In looking at tunnels, whether it is the Transbay Tube on the BART (Bay Area Rapid Transportation) system or the Caldecott tunnel, the models can predict whether the tunnel would fail or if liquefaction will occur around it, Noble said.

For the levees, Noble will not only be able to model the material they are made of (mostly sand) but also the water within them.

“The levees are very important for California and they’ve probably been neglected,” he said. “This effort will demonstrate the degree to which this is a vulnerability.”

But the Hayward fault isn’t the only fault that the region has to worry about. The San Andreas Fault has a 21 percent chance of rupturing in the next 30 years. Larsen’s model of the scenario earthquake along the San Andreas Fault is of particular interest to study.

“For the scenario earthquake, you can see how the seismic energy slams into the San Francisco Area, and also how ground motion will be severe in the central and southern portions of the Central Valley,” he said. “There are other items of interest such as energy shooting into the Central Valley due to the geologic structure and high ground shaking in the valleys of the Bay Area.”

And all we have to do is look at what happened 100 years ago to realize that Mother Nature doesn’t necessarily give us forewarning.

“Future earthquakes are inevitable,” Zoback said. “There’s no safe place in the Bay Area.”

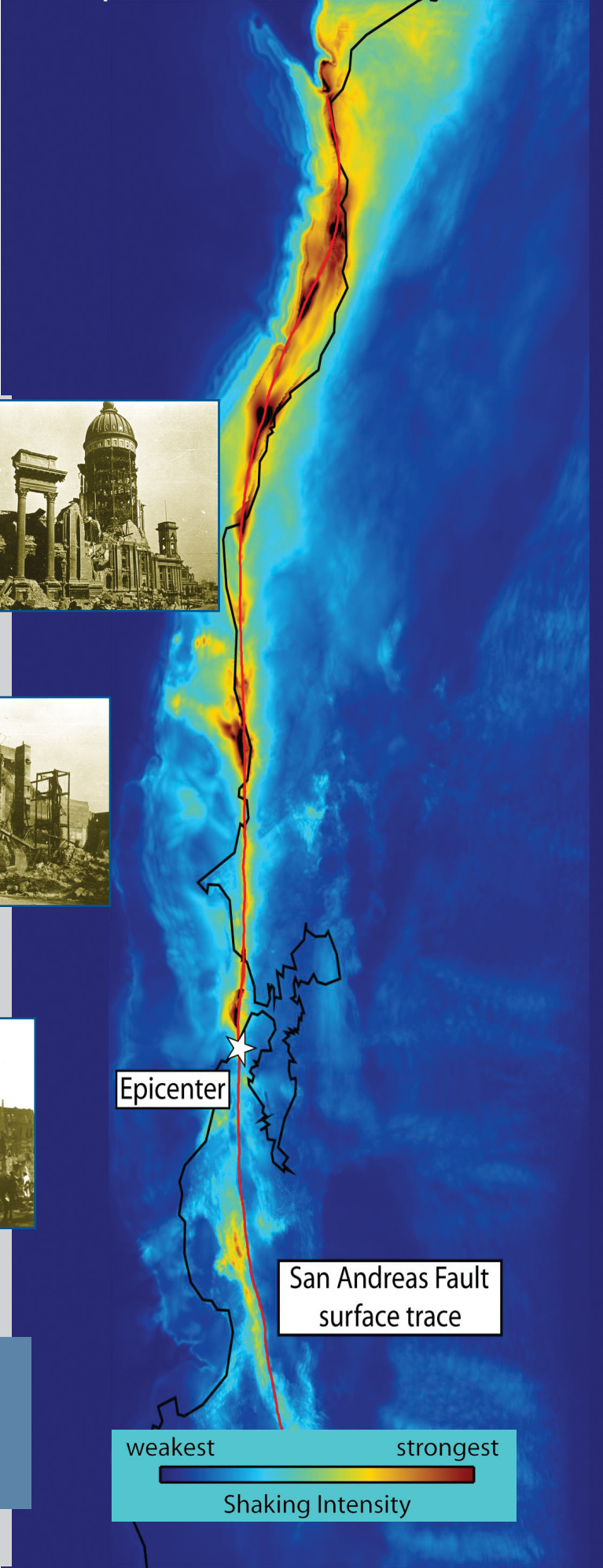
FACTS AT A GLANCE

THE 1906 SAN FRANCISCO EARTHQUAKE

- April 18, 1906, 5:12 a.m.
- 7.8 magnitude
- Lasted 45-60 seconds
- Rupture propagated at a speed of 5,800 miles/hour
- The San Andreas Fault ruptured along 296 miles from San Juan Bautista to Cape Mendocino
- Pacific Plate and North American plates offset was 20 feet
- Approximately 800 deaths
- 225,000 left homeless from a population of about 400,000
- 28,188 buildings destroyed
- More than \$400 million in property damage loss from the earthquake and ensuing fire
- The 1906 quake marked the beginning of modern earthquake science

SOURCE: U.S. GEOLOGICAL SURVEY

At right: Ground shaking amplitude for a simulation of the 1906 earthquake. Insets: The damage that occurred throughout San Francisco during that earthquake.



SCIENCE NEWS

Second blue planetary ring discovered around Uranus

By Anne M. Stark
Newsline staff writer

Blue may be a color that most of us can feel, but the solar system’s seventh planet is feeling it, too — in its outermost ring.

The outermost ring of Uranus, discovered late last year, is bright blue, making it only the second known blue ring in the solar system.

Saturn’s E ring is the only other known example of a blue planetary ring. The blue rings of Saturn and Uranus both are associated with small moons.

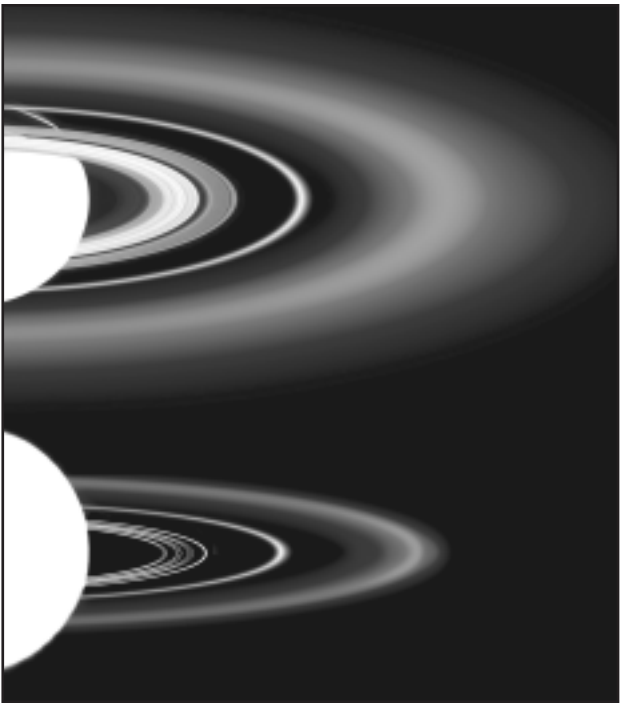
According to recent research, the particles in the blue ring around Uranus are likely produced by impacts on Mab, one of Uranus’ smallest moons. Mab is embedded within the blue ring.

The research, conducted by Lab scientist Seran Gibbard, Imke de Pater of UC Berkeley, Mark Showalter of the SETI Institute and Heidi Hammel of the Space Science Institute, indicates that the similarity between the outer rings of Saturn and Uranus may be due to a similar production mechanism for both rings.

Earlier research attributes Saturn’s blue ring to the small dust, gas and ice particles spewed into the orbit of Enceladus, one of Saturn’s moons. But now scientists say the newly discovered plumes on the Enceladus surface may have caused the blue ring. However, Mab is likely a small, dead rocky ball about 15 miles across that could not churn out plumes of material.

“We suspect that both rings owe their blue color to gravitational forces acting on dust in the rings that allow smaller particles to survive while larger ones are recaptured by the moon,” Gibbard said.

Earlier this year, scientists discovered two faint rings, located well outside of Uranus’ main ring system. The outer ring is centered on the orbit of the tiny moon Mab and is blue, while the other ring, which orbits between the moons Rosalind and Portia, is red. Rings around the giant



A schematic view of the outer rings of Saturn and Uranus, in which each system has been scaled to a common planetary radius. Uranus’ main rings are drawn to emphasize that these rings are extremely narrow.

planets in our solar system — Jupiter, Saturn, Uranus and Neptune — are typically reddish because they contain many large particles that mostly reflect longer (red) wavelengths of light.

Though the recent research doesn’t provide a definitive reason as to why the newly discovered ring is blue, there are some earlier theories that were proposed before the Cassini spacecraft flew by Enceladus and discovered plumes coming from that moon.

That model predicted that meteoroid impacts on the surface of Enceladus scatter debris into its orbit in a broad range of sizes. While the larger pieces remain within the moon’s orbit and eventually are swept up by the moon, smaller particles are subject to subtle forces that push them toward or away from the planet, out of the moon’s orbit. These forces include pressure from sunlight, magnetic torques acting on charged dust particles and the influence of slight variations in gravity due to the equatorial bulge of Saturn.

The net result is a broad ring of smaller particles, less than a tenth of a micron across — a thousandth the width of a human hair — that scatter and reflect predominantly blue light.

“This model can be transferred directly to what we now see in Uranus,” de Pater said, although the researchers still need to understand the details of the process.

The blue ring was discovered after combining ground-based near-infrared observations from the Keck Telescope in Hawaii and visible-light photos taken by the Hubble Space Telescope. After other scientists discovered two new rings — Uranus’ 12th and 13th — and two new moons, Mab and Cupid, de Pater, Hammel and Gibbard reported seeing the red, innermost of the two new rings, but not the outermost.

The outer ring could be seen in visible light but was not observable in the near-infrared, which indicates that it must be blue. Mab also could not be seen in the infrared, so it is likely covered with water ice, like the other outer moons of Uranus.

“If the surface of Mab had been similar to Uranus’ other inner moons, we would have seen it in the infrared,” Gibbard said. “This implies that it’s probably covered by water-ice, like Uranus’ larger moons.”

The research appeared in the April 7 issue of the journal, *Science*.

Navajo Nation Council members visit the Laboratory

Members of the Navajo Council, led by Council speaker Lawrence T. Morgan Nation, visited the Laboratory in late March 1.

The Navajo Nation has the country’s largest legislative tribal council and also is the largest energy-producing tribe. It has vast amounts of coal, oil and gas along with other natural resources within the 27,000 square miles of Navajo land spread across three states. The Navajo Nation is larger than some states, such as West Virginia.

The purpose of the visit was to discuss partnership and collaboration opportunities with senior Lab officials and to tour research facilities. Morgan said the Navajo Nation faces many technical issues daily and needs tribal expertise in science and technology. As a national resource, the national labs can advise the tribes in technical decisions, according to Morgan, who was impressed by the number of Navajo students who have worked at LLNL over the years.

The tribal delegation toured the National Ignition Facility, National Atmospheric Release Advisory Center and the Terascale Simulation Facility.

The Laboratory was the first national lab to sign a Memorandum of Agreement with a tribe and tribal institution, the Navajo’s Dine College, an agreement that still holds today, according to Steve Grey, manager of the DOE/LLNL field office in Shiprock, N.M. Grey recently served as Indian Affairs director at DOE headquarters in Washington D.C.

Ron Cochran, Laboratory executive officer, hosted the visit and said, “The Laboratory is very proud of its record of working with tribes such as the Navajo Nation.”



PEOPLE NEWS

IN MEMORIAM

Donald Bradley

Donald Franklin Bradley of Las Vegas, Nev. died March 5. He was 82.

Born in Plainfield, N.J., he resided in Nevada for more than 40 years. During World War II, he served as a corporal in the U.S. Army. He graduated from the Art Center College of Design in California and pursued a career in creative photography while traveling around the world. His photos appeared in many magazines and publications and included those of such

famous individuals as President John F. Kennedy and Edward Teller.

For more than 30 years, he served as a photographer for the nuclear weapons development program at LLNL and the Nevada Test Site.

He is survived by his wife of 50 years, Jenny Bradley; sons Bruce Bradley and Paul Bradley; daughter-in-law Sharon Bradley; and grandchildren Alden and Winston Bradley.

Services were held in Boulder City, Nev.

Henry Lee Spears

Henry Lee Spears died March 30 in Corvallis, Ore. He was 90.

Born in Franklin, Ky. to Clarence and Daisy Spears, he married Ethel Cunningham. After her death he married Ruby Vogel.

Spears served in the U.S. Navy between 1934 and 1954. He worked as a mechanical technician at the Laboratory from 1954 until retiring in 1971. He was a member of the Fleet

Reserve Association.

He is survived by five children: Harry Richard Spears of Livermore; Jack Dennis Spears of Corvallis, Ore.; Beverly Louise Fifield of Littleton, Colo., Patricia Ann Rankin of Livermore; Jesse Lee Spears of Nevada City, Calif.; 11 grandchildren and nine great-grandchildren.

A memorial service was held in Livermore.

Elmie “Ray” Newton

E. Ray Newton, a native of Pauls Valley, Okla. and a longtime Livermore resident, died Sunday, March 26 in Henderson, Nev. after a prolonged illness. He was 74.

Newton retired from the Laboratory, where he was employed as

a scientific coordinator at Site 300.

He is survived by his wife, Kay Newton, four sons, and nine grandchildren.

Donations may be made in his name to the Make-a-Wish Foundation.

Diane Kay Taasevigen

Diane Taasevigen, a former Laboratory employee, died Thursday, April 6. She was 60.

Taasevigen was born on Feb. 20, 1946 in Kindred, N.D., and lived in Livermore for 38 years.

She was an active member of the Livermore community. After she retired from the Lab she opened the ‘Clay Place’ in downtown Livermore. She contributed to Livermore’s public art collection, including the Fitness Day Obelisk in Robertson Park and the Wine Country Wall in downtown Livermore. She was an active member of Cornerstone Fellowship in Livermore and taught quilting, pottery

and Bible study to both children and adults.

She is survived by her husband of 34 years, Norman Taasevigen; daughters Tammy Mueller of Brentwood and Dawn Taasevigen of Oakland; son Everett Taasevigen of San Jose; and grandson Aric Krysl of Brentwood.

A memorial service will be held at 10 a.m. Saturday, April 15 at Cornerstone Fellowship, 348 North Canyon Parkway, Livermore. Interment will be private. Remembrances may be sent to ROHI c/o Cornerstone Fellowship.

RETIREEES’ corner

Garith (Engineering 2002) and Amy Helm (Laboratory Services 2002) enjoyed a 16-day Panama Canal cruise from San Diego to Tampa, Fla. in January. Ports of call included Mexico, Guatemala, Costa Rica and Colombia.

Highlights were an open-air tram through the rain forest in Costa Rica, the walled city in Cartagena, Colombia and, of course, the transit through the Panama Canal while enjoying “Panama rolls,” coffee and the sunrise.

Bill (Engineering, 1989) and Sue Simecka (Engineering, 1983) are still enjoying retirement and are involved in the Performing Arts Club at Sun City Anthem, Nev. Bill is the new vice president and Sue will be performing two dance numbers in the upcoming show. Bill is in the Billiards Club and Sue is a lead anchor on Channel 99.

Joan Gigliati (Engineering, 2004) has been a volunteer for the Valley Humane Society doing office work (answering phones, computer entry, etc.) for several months now and enjoys it very much. She works about eight hours a month. They are always looking for more volunteers to help in the following areas: dog handlers and fosters, cat fosters, cat care and comfort, office and administration, fund-raisers, special events and public relations, pet therapy, Paws-To-Read children’s



reading program, Just-Like-New medical fund and more. If anyone is interested, contact Wendy McNelly, operations director, VHS at (925) 426-8656. Any help is appreciated. Joan also has recently taken a quilting class with five other women, including Jane Olson (Mechanical Engineering, 1993).

April’s retiree luncheon will be at noon Wednesday, April 19, at the Elks Lodge in Livermore, 940 Larkspur Drive.

(Reservations: www.llnlretirees.org). Our speaker will be Linda Barton, Livermore city manager. Her talk is entitled: “Eminent Domain.” Also, mark your calendars for the annual picnic at Ravenswood on Wednesday, June 21.

The travel group will meet Tuesday, April 25, at 2 p.m. in the Community Room of the Livermore Police building, 1110 S. Livermore Ave. The topic is “Western China and Mongolia,” by Miles and Jackie Loyd.

This is a shortened version for *Newsline*, but a full unedited version is available on the Retirees’ Web page: (www.llnlretirees.org).

Send input to Jane or Gus Olson. E-Mail: AugustO@aol.com or JaneRubert@aol.com. Phone: (925) 443-4349, snail mail address: 493 Joyce St., Livermore, CA 94550

NEWSLINE

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Newsline is published bi-weekly by the Public Affairs Office, Lawrence Livermore National Laboratory (LLNL), for Laboratory employees and retirees.

Photographer: Jacqueline McBride
Designer: Julie Korhummel, 2-9709
Distribution: Mail Services at LLNL

Public Affairs Office: L-797 (Trailer 6527), LLNL, P.O. Box 808, Livermore, CA 94551-0808
Telephone: (925) 422-4599; Fax: (925) 422-9291
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First observation of neutrino transformation reported

By Anne M. Stark
Newsline staff writer

Scientists have successfully observed the transformation of neutrinos — a particle that is relatively massless, has no electric charge, yet is fundamental to the structure of the universe — from one type to another.

The international team, including Livermore physicists Peter Barnes, Doug Wright and Ed Hartouni, working on the Main Injector Neutrino Oscillation Search (MINOS) project, announced the first results of a new neutrino experiment.

Using two giant detectors, one at Fermilab and another in a historic iron mine in northern Minnesota, the team is working to solve a 50-year-old mystery — How exactly do these particles “change flavors?”

Neutrinos come in three “flavors:” electron, muon and tau. Each is related to a charged particle, which gives the corresponding neutrino its name. Neutrinos are extremely difficult to detect because they rarely interact with anything. They can pass easily through solid objects such as a planet, walls or even a human hand without leaving a trace of their existence.

Sending a high-intensity beam of muon neutrinos from the Fermilab site in Batavia, Ill., to the particle detector in Soudan, Minn., scientists observed the disappearance of a significant fraction of these neutrinos. The observation is consistent with an effect known as neutrino oscillation, in which neutrinos change from one kind to another.

These findings may shed some light on how galaxies formed and why antimatter has disappeared. The abundance of neutrinos in the universe, produced by stars and

nuclear processes, may explain the origin of the neutrons, protons and electrons that make up all the matter in the world around us.

“This is a milestone of the progress in this field,” Barnes said.



FERMILAB

The groundbreaking for the cavern of the MINOS far detector was on July 20, 1999. The excavation of the cavern took about two years, followed by the two-year construction of the detector. The University of Minnesota Foundation commissioned a mural for the MINOS cavern, painted onto the rock wall, 59 feet wide by 25 feet high. The mural contains images of scientists such as Enrico Fermi and Wolfgang Pauli, Wilson Hall at Fermilab, George Shultz, a key figure in the history of Minnesota mining, and some surprises.

The neutrinos were generated along the underground beam line at Fermilab, passed through the near detector at Fermi, and traveled through the Earth to the detector in Minnesota. The MINOS scientists chose the distance to the far detector to maximize the oscillation probability, which gives them the best opportunity to directly study the neutrino “flavor change.”

If neutrinos had no mass, the particles would not change as they traverse the Earth, and the MINOS detector in Soudan would have recorded about 177 muon neutrinos. Instead, the MINOS collaboration found only 92 muon neutrinos — a clear observation of muon neutrino disappearance.

This conclusion indicates that neutrinos do have some mass, small as it may be, in order for them to oscillate. So a portion of the muon neutrinos emitted from the beam could have changed flavors to electron or tau neutrinos before reaching Minnesota.

Studying the nebulous neutrino will help scientists better understand particle physics, specifically how particles acquire mass, as well as its role in the formation of the universe and its relationship to dark matter.

Livermore’s portion of the project is funded by Laboratory Directed Research and Development and the Physical Data Research Program. The MINOS effort as a whole is funded by the Department of Energy’s Office of Science, High Energy

Physics division.

The MINOS experiment includes about 150 scientists, engineers, technical specialists and students from 32 institutions in six countries. The results were announced March 30 at Fermilab.

Earth Expo 2006 to spotlight Lab’s environmental stewardship

Earth Expo returns with a local focus and a new location on Wednesday, April 19, from 11:30 a.m. to 1 p.m. at the Central Cafeteria patio.

“This year’s goal is to highlight ways in which the Lab is a good steward of the environment,” said Bruce Campbell, Earth Expo coordinator. “Posters on display will focus on the different roles Laboratory employees play to do this.”

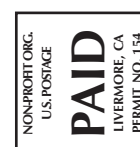
The topics of Earth Expo exhibits will include: site ecology, resource conservation (energy efficiency/water/materials), environmental compliance, the environmental management system, pollution prevention and pollution prevention awards, alternative fuels and transportation.



Campbell adds that many of the off-site environmental organizations and product displays traditionally associated with Earth Expo will be featured at the ES&H Fair slated for June 22.

Earth Expo attendees will have the opportunity to judge the poster displays by submitting a list of their three favorites into a drawing for a California native plant. Entry forms will be available at the two entrances to the patio area. In addition, the “Free Lunch Band” will provide entertainment during the event.

For questions about Earth Expo, contact Campbell at 3-3481, or Shari Brigdon at 3-7665.



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